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Community Perceptions of Drinking Water Quality, Access to Safe Water and Household Storage Practices in Nkwo-Egwu Community, Abia State, Nigeria

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ABSTRACT

Access to safe drinking water is essential for public health, yet water quality, availability, and household storage practices remain important concerns in many Nigerian communities. This study assessed community perceptions of drinking water quality, access to safe water, and household storage practices in Nkwo-Egwu Community, Umuahia North Local Government Area, Abia State, Nigeria. A total of 422 respondents participated in the study. Data were summarized using frequencies and percentages to describe respondents' sociodemographic characteristics, drinking water sources, water supply patterns, perceived physical characteristics of drinking water, and household storage methods. Females constituted 61.85% of the respondents, while males accounted for 38.15%. Public boreholes were the most commonly reported drinking water source (49.76%), followed by sachet water (29.38%), private boreholes (13.27%), and streams (7.58%). Regarding water availability, 50.71% of respondents reported daily supply, while 20.40% indicated that water was available all the time. However, some respondents experienced twice-weekly, weekly, or irregular water supply. Concerning perceived water characteristics, 24.17% described their drinking water as tasteless, 22.75% as odourless, and 21.56% as colourless. Household storage practices showed that booters were the most frequently reported storage vessels (62.80%), followed by buckets (32.92%). These findings indicate that public boreholes and sachet water were the predominant drinking water sources, while booters and buckets were the principal storage vessels. The study highlights the importance of reliable water supply, hygienic household storage, community health education, and routine water quality monitoring. Laboratory analysis is recommended to establish the microbiological and physicochemical safety of drinking water in the community.

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Introduction

Access to safe drinking water is fundamental to human health, wellbeing, and socioeconomic development. Despite global efforts to improve water supply and sanitation, millions of people continue to experience difficulties accessing adequate and microbiologically safe drinking water, particularly in low- and middle-income countries. Sustainable Development Goal 6 emphasizes universal and equitable access to safe and affordable drinking water by 2030. However, achieving this target requires more than providing water sources; it also involves ensuring acceptable water quality, reliable availability, convenient access, and appropriate household handling and storage practices [1-3].

Drinking water quality is an important public health concern because water contaminated with pathogenic microorganisms or hazardous chemicals can transmit diseases and cause adverse health effects. Contaminated drinking water has been associated with diarrhoeal diseases and infections caused by bacteria, viruses, protozoa, and other pathogens [3, 4]. Importantly, water that appears clear, colourless, and odourless may still contain harmful microorganisms or chemical contaminants. Consequently, community perceptions of water quality based on appearance, taste, and smell may not accurately reflect its actual safety [3]. Understanding these perceptions is therefore essential for developing effective water safety education and promoting appropriate household water management practices.

In Nigeria, access to safe drinking water remains a significant environmental health challenge, particularly in communities where public water infrastructure is inadequate or unreliable. Households frequently depend on boreholes, wells, streams, rainwater, and commercially packaged water to meet their domestic needs. The choice of water source is influenced by availability, affordability, distance, household income, and perceived quality [5]. National water, sanitation, and hygiene assessments have also highlighted persistent inequalities in access to safe water and concerns about contamination at the household level [6]. These challenges demonstrate the need to examine not only water availability but also the factors influencing household water choices and perceptions of safety.

Evidence from southeastern Nigeria illustrates these concerns. Reported variations in the physicochemical and bacteriological characteristics of domestic water sources in rural communities of southeastern Nigeria [7]. Similarly, studies investigating drinking water in Abia State have identified physicochemical parameters requiring attention and emphasized the importance of routine

monitoring and appropriate water treatment [8, 9]. Furthermore, investigated parasitic contamination and physicochemical characteristics of drinking water sources in Nkwo-Egwu Community, Umuahia North Local Government Area, Abia State [10]. This locally relevant evidence reinforces the importance of understanding household water safety beyond the selection of water sources alone.

Household storage practices constitute another important determinant of drinking water safety. Water may become contaminated after collection through the use of unclean containers, uncovered storage vessels, repeated hand contact, and the introduction of contaminated utensils. Research has demonstrated that storage conditions can influence the physicochemical quality of household drinking water [11]. Appropriate practices, including using clean, covered, narrow-necked containers and dispensing water without directly dipping hands or unclean cups into storage vessels, can help reduce contamination risks [12]. Household water treatment methods, including boiling, filtration, and chlorination, may also improve safety when applied correctly.

Community perceptions influence whether households recognize contamination risks, treat drinking water, and adopt safe storage practices. However, perceptions may differ from actual water quality, making community-based assessment important. Therefore, this study assesses community perceptions of drinking water quality, access to safe water, and household storage practices in Nkwo-Egwu Community, Abia State, Nigeria. The findings are expected to provide evidence for targeted health education, improved household water management, and interventions aimed at strengthening access to safe drinking water.

Materials and Methods

Study Area

This study was carried out at Nkwo-egwu community, Umuahia North L.G.A the capital city of Abia State, Nigeria. Geographically, it is located within Latitude 5º 29.5′-5º 42′ N and Longitude 7º 24.3′ - 7º 34.7′ E within the forest belt. The area is characterized by high temperatures of about 29º-31ºC and has double maximal rainfall peaks in July and September. It is bound in the North by Isuikwuato L.G.A, Umuahia South in the South, Bend LGA in the East and the Imo River demarcates it with Imo State in the Western part. It has an area of 245km2 and a population of 220,660 at the 2006 census [11]. Most of the inhabitants of the community are farmers, public servants, traders and students.

Study Design

A descriptive cross-sectional survey design was employed to assess community perceptions of drinking water quality, access to safe water, and household water storage practices. The design enabled the collection of information from residents at a particular period and the description of their reported water sources, supply patterns, perceptions, and storage methods.

Study Population and Sample Size

The study population comprised residents of Nkwo-Egwu Community, Umuahia North Local Government Area, Abia State, Nigeria. A total of 422 respondents participated in the study. The respondents provided information on their sociodemographic characteristics, drinking water sources, frequency of water supply, perceived physical characteristics of drinking water, and household storage methods.

Determination of Sample Size

The sample size for source(s) of drinking water available at Nkwo-egwu community, will be determined using

$$n = \frac{Z^2 p^1 q^1}{d^2}$$

Where n = Sample size.
Z = Probability distribution (1.96)
q^1 = National prevalence of households with improved water supply = 48%

$$q^1 = 1 - p^1 = 52\%(0.52)$$

d = Precision at 5% (0.05)
Therefore,

$$\frac{(1.96)^2 \times 0.48 \times 0.52}{(0.52)^2} \approx 383.53$$

Thus, the minimum sample size was 384 households. Ten per cent of the calculated minimum sample size was added to take care of non-response. i.e. 0.1x 384 = 38.4 was added to 384 to make it approximately 422.

Data Collection and Questionnaire Administration

Data were collected using a structured questionnaire administered to the respondents. The questionnaire covered five major areas: sociodemographic characteristics, sources of drinking water, frequency of water supply, perceptions of drinking water characteristics, and household water storage practices. Sociodemographic information included age, sex, educational attainment, and occupation. Respondents also identified their principal drinking water sources and described the frequency of water availability in their households. Perceptions of drinking water quality were assessed using reported physical characteristics, including colour, taste, and odour. Household storage practices were evaluated by identifying the vessels used to store drinking water, including booters, buckets, containers, and clay pots.

Data Analysis

Data were summarized using descriptive statistics, including frequencies and percentages. The results were presented in tables to illustrate the distribution of respondents according to sociodemographic characteristics, drinking water sources, water supply frequency, perceived water characteristics, and household storage methods.

Result

Table 1 presents Socio-Demographic Characteristics of Respondents. A total of 422 respondents participated in the study, comprising 261 females and 161 males. The largest age group was 30–39 years (27.5%), followed by 40–49 years (21.32%). Secondary education was the most common educational level (36.72%), followed by tertiary education (34.60%). Trading was the leading occupation (32.0%), followed by civil service (28.2%) and farming (22.03%). These findings indicate that respondents represented diverse demographic and socioeconomic backgrounds. Table 2 presents Sources of Drinking Water. Public boreholes were the predominant drinking water source, used by 210 respondents (49.76%). Sachet water ranked second, accounting for 124 respondents (29.38%). Private boreholes were used by 56 respondents (13.27%), while 32 (7.58%) obtained water from streams. No respondents reported rainwater collection. Thus, public boreholes and sachet water were the major drinking water sources in the community. Table 3 presents Frequency of Water Supply. Daily water supply was reported by 214 respondents (50.71%), while 86 (20.40%) had water available continuously.

However, 63 respondents (15.0%) received water twice weekly, 32 (7.60%) experienced irregular supply, and 27 (6.40%) received water weekly. These findings suggest that although daily access was common, some households experienced inconsistent water availability. Table 4 illustravtes Perceptions of Physical Characteristics of Drinking Water. Multiple physical characteristics were reported by 133 respondents (31.51%). Tastelessness was identified by 102 respondents (24.17%), followed by odourlessness (22.75%) and colourlessness (21.56%). These findings indicate that residents perceived drinking water quality through sensory characteristics. However, these characteristics alone cannot establish whether water is microbiologically or chemically safe. Table 5 presents Water Sources and Educational Status. Public boreholes were frequently used by respondents with secondary education, representing 66 users (38.0%). Respondents with tertiary education accounted for 71 sachet water users (55.46%). Secondary-educated respondents also constituted 50.0% of private borehole users. Stream use was highest among respondents without formal education, accounting for 45.0% of stream users. These findings suggest variations in water source selection across educational groups, although statistical testing is required to determine whether the differences were significant. Table 6 presents Water Sources and Educational Status. Public boreholes were the most frequently reported source, with 210 users, followed by sachet water (124), private boreholes (56), and streams (32). Respondents with secondary education accounted for 87 public borehole users (41.42%), while tertiary-educated respondents represented 64 sachet water users (51.61%). Secondary-educated respondents also constituted 38.0% of private borehole users and stream users. The findings indicate differences in reported water sources across educational categories during the study period. Table 7 presents Household Water Storage Methods. Booters were the most commonly reported storage vessels, used by 265 respondents (62.80%), followed by buckets (139; 32.92%). Containers were used by 15 respondents (3.60%), while clay pots were used by only three (0.71%). The findings demonstrate that booters and buckets were the predominant household water storage methods. Their cleanliness, covering, and handling are important considerations when assessing potential contamination risks.

Table 1: Distribution of Respondents According to Age, Sex, Educational Attainment and Occupation

Age (years)	Sex		Total
	Female	Male	
<20	41 (15.7)	40 (25.0)	81 (19.2)
20-29	26 (9.96)	21 (13.0)	47 (11.13)
30-39	72 (27.6)	44 (27.3)	116 (27.5)
40-49	68 (26.1)	22 (13.7)	90 (21.32)
50-59	23 (8.8)	18 (11.2)	41 (9.71)
60-69	20 (7.7)	11 (6.8)	31 (7.34)
≥70	11 (4.2	5 (3.1)	16 (3.8)
Education			
Tertiary	79 (30.3)	67 (41.61)	146 (34.60)
Secondary	106 (40.61)	49 (30.43)	155 (36.72)
Primary	40 (15.32)	23 (14.3)	63 (14.92)
No formal	36 (13.80)	22 (13.70)	58 (13.74)
Occupation			
Civil service	61 (23.4)	58 (36.02)	19 (28.2)
Trading	98 (37.54)	37 (23.0)	135 (32.0)
Farming	52 (19.92)	41 (25.46)	93 (22.03)
Others	50 (19.20)	25 (15.52)	75 (17.8)
Total	261 (100)	161 (100)	422 (100)

Table 2: Sources of Drinking Water

Sources of water	Frequency	Percentage (%)
Public borehole	210	49.76
Private borehole	56	13.27
Stream	32	7.58
Sachet water	124	29.38
Rain water	-	-
Total	422	100

Table 3: Frequency of Water Supply

Water supply	Frequency	Percentage (%)
All the time	86	20.40
Daily	214	50.71
Twice a week	63	15.0
Weekly	27	6.40
Irregular	32	7.60
Total	422	100

Table 4: Perceptions of Physical Characteristics of Drinking Water

Characteristics	Frequency	Percentage (%)
Colourless	91	21.56
Odourless	96	22.75
Tasteless	102	24.17
Multiple responses	133	31.51
Total	422	100

Table 5: Relationship Between Sources of Drinking Water and Educational Status of Respondent Between June-August

Sources of water	Education				
	No formal education No (%)	Primary education No (%)	Secondary education No (%)	Tertiary education No (%)	Total (%)
Streams	9 (45.0)	4 (20.0)	5 (25.0)	2 (10.0)	20 (4.7)
Public borehole	23 (14.0)	33 (19.04)	66 (38.0)	57 (30.4)	179 (42.4)
Private borehole	8 (15.0)	6 (11.11)	27 (50.0)	13 (24.07)	54 (12.7)
Sachet water	4 (3.12)	8 (6.3)	45 (35.20)	71 (55.46)	128 (30.3)
Rainwater	14 (29.3)	12 (29.3)	12 (29.30)	3 (7.31)	41 (9.7)
Total	58 (14)	63 (15)	155 (37)	146 (35)	422 (100.0)

Table 6: Relationship Between Sources of Drinking Water and Educational Status of Respondent Between March-May

Sources of water	Education				
	No formal education No. (%)	Primary education No. (%)	Secondary education No. (%)	Tertiary education No. (%)	Total (%)
Streams	11 (34.4)	7 (22.00)	12 (38.00)	2 (6.50)	32 (7.5)
Public borehole	30 (14.28)	26 (12.38)	87 (41.42)	11 (5.23)	210 (49.7)
Private borehole	8 (14.3)	14 (25.0)	21 (38.00)	13 (23.21)	56 (13.2)
Sachet water	9 (7.30)	16 (13.0)	35 (28.22)	64 (51.61)	124 (29.3)
Total	58 (14.0)	63 (15.0)	155 (37.0)	14 (35.0)	422 (100.0)

Table 7: Different Storage Methods Used by Residents of Nkwo-Egwu

Storage methods	Frequency	(%)
Containers	15	3.60
Clay pot	3	0.71
Bucket	139	32.92
Booter	265	62.80
Total	422	100

Discussion

The study assessed community perceptions of drinking water quality, access to water, and household storage practices among 422 respondents in Nkwo-Egwu Community, Abia State, Nigeria. The findings provide insights into water source preferences, supply patterns, perceived water characteristics, and domestic storage methods.

The sociodemographic characteristics revealed that females constituted the majority of respondents (61.85%), while the 30–39-year age group represented the largest proportion (27.5%). Secondary education was the most common educational qualification, and trading was the predominant occupation. These characteristics are relevant because educational attainment, socioeconomic status, and household responsibilities can influence water source selection and water management practices [1,5]. However, the present study did not establish statistically significant relationships between these characteristics and water-related behaviours.

Public boreholes were the predominant drinking water source (49.76%), followed by sachet water (29.38%). This pattern is consistent with findings from Port Harcourt, where households relied substantially on boreholes and commercially packaged water because of limited municipal water supply [13,14]. Similarly, studies in Nigeria have documented dependence on alternative water sources where reliable piped supplies are unavailable [5, 15]. Nevertheless, borehole water and sachet water cannot automatically be considered safe without appropriate quality monitoring. Research has demonstrated that microbial contamination may occur in groundwater and packaged drinking water [4,14]. Therefore, routine monitoring and appropriate treatment remain important for protecting public health [3].

Regarding water availability, 50.71% of respondents reported daily supply, while 20.40% indicated continuous availability. However, 29.0% experienced weekly, twice-weekly, or irregular supply. These findings suggest that access was not consistent for all households. Inadequate or unreliable water services may encourage households to store water for subsequent use, increasing the importance of safe handling practices [1]. It is also identified socioeconomic and geographical factors as important determinants of household access to drinking water in Nigeria [5].

Concerning perceived water quality, 24.17% of respondents described their water as tasteless, 22.75% as odourless, and 21.56% as colourless. Although these characteristics may influence acceptability, they cannot independently establish whether drinking water is safe. Demonstrated that microbiological contamination affects different drinking water sources, including sources classified as improved [4]. Similarly, they reported deterioration in bacteriological water quality between source collection and household consumption in Ibadan, Nigeria. Consequently, laboratory testing is necessary to determine whether water meets established microbiological and physicochemical standards [3].

Household storage findings showed that booters were the most frequently reported storage vessels (62.80%), followed by buckets (32.92%). These findings highlight the importance of examining container cleanliness, covering, and dispensing practices. He found that drinking water quality frequently deteriorates between collection and consumption [4]. In addition, demonstrated that storage container characteristics can influence household drinking water quality. Similarly reported differences in physicochemical parameters between water stored in different vessel types [11,16]. Appropriate storage practices, including using clean, covered containers and avoiding direct contact between stored water and contaminated hands or utensils, are therefore essential [12].

Overall, the findings demonstrate the importance of reliable water access, accurate public understanding of water safety, and hygienic household storage. Community health education, regular water quality surveillance, and improved water supply infrastructure should be prioritized. Future studies should combine household surveys with laboratory analysis to establish the actual safety of drinking water in Nkwo-Egwu Community.

Conclusion

This study assessed community perceptions of drinking water quality, access to safe water, and household storage practices in Nkwo-Egwu Community, Umuahia North Local Government Area, Abia State, Nigeria. The findings revealed that public boreholes and sachet water were the predominant drinking water sources, while daily water supply was reported by most respondents. However, some residents experienced irregular or less frequent water supply. Respondents assessed drinking water quality mainly through physical characteristics such as taste, odour, and colour. Booters and buckets were the most commonly used household water storage vessels. These findings highlight the importance of reliable water supply, appropriate household storage, and improved awareness of drinking water safety. Nevertheless, perceived water quality does not necessarily indicate actual water safety. Therefore, regular microbiological and physicochemical testing, community health education, proper cleaning and covering of storage vessels, and improved access to safe drinking water are recommended to protect public health and promote sustainable water management in the community.

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